fL

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/528,379	03/17/2000	John W. Gillespie JR.	131*182	4271

23416 7590 08/22/2003

CONNOLLY BOVE LODGE & HUTZ, LLP
1220 N MARKET STREET
P O BOX 2207
WILMINGTON, DE 19899

EXAMINER	
BARAN, MARY C	

ART UNIT	PAPER NUMBER
2857	

DATE MAILED: 08/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/528,379	GILLESPIE ET AL.
	Examiner	**Art Unit**
	Mary Kate B Baran	2857

-- The MAILING DATE of this communication appears on th c ver sheet with the correspondenc address --

Period f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 16 June 2003.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-15 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-15 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on 16 June 2003 is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. This action is responsive to amendments filed 16 June 2003. Claims 1-15 are pending. Claims 1, 9 and 13 have been amended.

2. The amendments filed on 16 June 2002 are sufficient to overcome the prior 35 U.S.C. 112 fourth paragraph rejections and abstract objections.

Drawings

3. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 16 June 2003 have been received and are accepted by the Examiner. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bache (U.S. Patent No. 4,979,992) in view Owen et al. (U.S. Patent No. 6,023,980) (hereinafter Owen) and further in view of Tse (U.S. Patent No. 4,662,228).

Referring to claim 1, Bache teaches a dynamic interphase-loading apparatus (DILA) for testing the mechanical properties of a composite (see Bache, column 20 lines 28-29) under quasi-static (see Bache, column 19 lines 27-34) to dynamic (see Bache, column 76 lines 39-46) (high strain rate and fatigue) loading conditions, the apparatus comprising: means for providing a quasi-static to dynamic load to the composite (see Bache, column 68 lines 26-32); means for continuously monitoring the load applied to the composite and providing a signal representative thereof (see Bache, column 68 lines 26-40); means for continuously monitoring the displacement of the interphase of the composite and providing a signal representative thereof (see Bache, column 61 lines 20-28); and generating information representing the mechanical properties of the composite (see Bache, column 61 lines 20-45).

Bache does not teach a fiber/matrix interphase composite; means for forming various input signals to activate the piezoelectric actuator and to generate various displacement rates; or a computing means for receiving the load signal from the load monitoring means, for receiving the displacement signal from the displacement monitoring means, and for providing an input signal to the piezoelectric actuator, the computing means having a memory means connected to a processing means, wherein the processing means stores the load signal in the memory means, and generates the input signal supplied to the piezoelectric actuator.

Owen teaches means for forming various input signals to activate a piezoelectric actuator and to generate various displacement rates (see Owen, column 3 line 63 – column 4 line 6); and a computing means for receiving the load signal from the load monitoring means (see Owen, column 8 lines 1-5), for receiving the displacement signal from the displacement monitoring means, and for providing an input signal to the piezoelectric actuator (see Owen, column 8 lines 10-30), the computing means having a memory means connected to a processing means, wherein the processing means stores the load signal in the memory means (see Owen, column 8 lines 1-5), and generates the input signal supplied to the piezoelectric actuator (see Owen, column 8 lines 56-67).

Tse teaches testing a fiber/matrix interphase composite (see Tse, column 6 lines 2-10).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Bache to include the teachings of Owen, because using a computer to generate signals would have allowed the skilled artisan to independently control the static and dynamic loading (see Owen, column 7 lines 53-57), using the computer to record test results would have allowed the skilled artisan to process the data (see Owen, column 9 lines 8-14) and using a piezoelectric actuator would have allowed the skilled artisan to track changes in temperature or other physical properties (see Owen, column 8 lines 40-44); and to further include the teachings of Tse because testing the interphase region of the fiber/matrix composite would have allowed the

skilled artisan to test the bonding (see Tse, Abstract) and measure the specific load changes (see Tse, column 6 lines 6-10).

Referring to claim 2, Bache discloses information representing the mechanical properties generated by the computing means comprising the interfacial shear strength (see Bache, column 71 lines 8-26), frictional sliding stress (see Bache, column 26 lines 54-64), energy absorbing capability (see Bache, column 24 lines 8-14), and stress-strain response (see Bache, column 40 lines 62-67) of the interphase of the fiber/matrix composite (see Bache, column 41 lines 29-38).

Referring to claim 3, Bache teaches computing means that generate information representing the durability of the interphase of the fiber/matrix composite (see Bache, column 16 lines 57-63).

Referring to claim 4, Bache discloses information representing the durability of the interphase of the fiber/matrix composite (see Bache, column 16 lines 57-63) comprising the fatigue life (see Bache, column 78 lines 17-20) and the residual strength after fatigue loading (see Bache, column 78 lines 30-34) or exposure to a hygrothermal environment of the interphase of the fiber/matrix composite (see Bache, column 54 lines 26-28).

Referring to claim 5, Bache teaches all the features of the claimed invention except for load providing means comprising a piezoelectric actuator.

Owen teaches load providing means comprising a piezoelectric actuator (see Owen, column 8 lines 53-55).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Bache to include the teachings of Owen, because a piezoelectric actuator allows the skilled artisan to track changes in temperature or other physical properties (see Owen, column 8 lines 40-44).

Referring to claim 6, Bache discloses a displacement monitoring means comprising a strain gauge bridge (see Bache, column 19 lines 9-34).

Referring to claim 7, Bache teaches all the features of the claimed invention except for a load monitoring means comprising a load cell.

Owen teaches a load monitoring means comprising a load cell (see Owen, column 10 lines 62-64).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Bache to include the teachings of Owen, because a load cell allows the skilled artisan to measure the applied static load (see Owen, column 10 lines 62-64).

Referring to claim 8, Bache teaches all the features of the claimed invention except for a means for forming various input signals comprising a waveform generator.

Owen discloses a means for forming various input signals comprises a waveform generator (see Owen, column 8 lines 31-44).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Bache to include the teachings of Owen, because using a waveform generator to form input signals allows the skilled artisan to create inputs independent of the machine resonance frequency (see Owen, column 8 lines 36-40).

Referring to claim 9, Bache teaches a method for testing the mechanical properties of a composite (see Bache, column 20 lines 28-29) under quasi-static (see Bache, column 19 lines 27-34) to dynamic loading conditions (see Bache, column 76 lines 39-46), the method comprising the steps of: providing a quasi-static to dynamic load to the composite (see Bache, column 68 lines 26-32); continuously monitoring the load applied to the composite and providing a signal representative thereof (see Bache, column 61 lines 20-28); and continuously monitoring the displacement of the interphase of the fiber/matrix composite and providing a signal representative thereof (see Bache, column 61 lines 20-28).

Bache does not teach using a diamond tip as a probe to load the interphase; debonding the fiber from the matrix at the interphase region and eventually pushing the fiber out from the matrix; receiving the load signal and the displacement signals in a computing means having a memory means connected to a processing means; providing

a control signal to the piezoelectric actuator, via the computing means; or using the processing means of the computing means to store the load signal in the memory means, generate the control signal supplied to the piezoelectric actuator, and generate information representing the mechanical properties of the interphase of the fiber/matrix composite.

Owen teaches receiving the load signal and the displacement signals in a computing means having a memory means connected to a processing means (see Owen, column 8 lines 1-5); providing a control signal to the piezoelectric actuator, via the computing means (see Owen, column 8 lines 10-30); and using the processing means of the computing means to store the load signal in the memory means (see Owen, column 8 lines 1-5), generate the control signal supplied to the piezoelectric actuator (see Owen, column 8 lines 56-67), and generate information representing the mechanical properties of the composite (see Owen, column 10 lines 2-10).

Tse teaches using a diamond tip (see Tse, column 5 lines 26-36) as a probe to load the interphase (see Tse, column 6 lines 6-10), and debonding the fiber from the matrix at the interphase region and eventually pushing the fiber out from the matrix (see Tse, column 6 lines 6-10).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Bache to include the teachings of Owen because using a computer to generate signals allows the skilled artisan to independently control the static and dynamic loading (see Owen, column 7 lines 53-57), further using the computer to record test results allows the skilled artisan to process the data (see Owen,

column 9 lines 8-14) and using a piezoelectric actuator allows the skilled artisan to track changes in temperature or other physical properties (see Owen, column 8 lines 40-44). It would have been further obvious to modify Bache and Owen to include the teachings of Tse, because using a diamond tip as a probe allows the skilled artisan to make the probe small and hard enough to break the bond between the fiber and the polymer (see Tse, column 5 line 61 – column 6 line 10), and debonding the fiber from the matrix allows the skilled artisan to measure the load changes (see Tse, column 6 lines 6-10).

Referring to claim 10, Bache discloses information representing the mechanical properties generated by the computing means comprising the interfacial shear strength (see Bache, column 71 lines 8-26), frictional sliding stress (see Bache, column 26 lines 54-64), energy absorbing capability (see Bache, column 24 lines 8-14), and stress-strain response (see Bache, column 40 lines 62-67) of the interphase of the fiber/matrix composite (see Bache, column 41 lines 29-38).

Referring to claim 11, Bache teaches using the processing means of the computing means to generate information representing the durability of the interphase of the fiber/matrix composite (see Bache, column 16 lines 57-63).

Referring to claim 12, Bache discloses information representing the durability of the interphase of the fiber/matrix composite (see Bache, column 16 lines 57-63) comprising the fatigue life (see Bache, column 78 lines 17-20) and the residual strength

after fatigue loading (see Bache, column 78 lines 30-34) or exposure to a hygrothermal environment of the interphase of the fiber/matrix composite (see Bache, column 54 lines 26-28).

Referring to claim 13, Bache and Tse teach all the features of the claimed invention except that the quasi-static to dynamic load provided to the fiber/matrix interphase is provided by a piezoelectric actuator.

Owen teaches that the quasi-static to dynamic load provided to the fiber/matrix interphase is provided by a piezoelectric actuator.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Bache and Tse to include the teachings of Owen, because a piezoelectric actuator allows the skilled artisan to track changes in temperature or other physical properties (see Owen, column 8 lines 40-44).

Referring to claim 14, Bache teaches that the displacement of the interphase is monitored with a strain gauge bridge (see Bache, column 19 lines 9-34).

Referring to claim 15, Bache and Tse teach all the features of the claimed invention except that the load applied to the interphase is monitored with a load cell.

Owen teaches that the load applied to the interphase is monitored with a load cell (see Owen, column 10 lines 62-64).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Bache and Tse to include the teachings of Owen, because the use of a load cell allows the skilled artisan to measure the applied static load (see Owen, column 10 lines 62-64).

Response to Arguments

5. Applicant's arguments filed 16 June 2003 have been fully considered but they are not persuasive.

Applicant argues that Bache does not teach a dynamic interphase-loading apparatus and a method for testing the mechanical properties of an interphase region of a fiber/matrix composite under quasi-static to dynamic loading conditions. However, Bache teaches a method for testing the mechanical properties (see Bache, column 57 line 27 – column 58 line 9) of a composite (see Bache, column 20 lines 28-29) under quasi-static (see Bache, column 19 lines 27-34) to dynamic loading conditions (see Bache, column 76 lines 39-46). Tse teaches testing the interphase region of a fiber/matrix composite (see Tse, column 6 lines 2-10). It would have been obvious at the time the invention was made to modify Bache to include the teachings of Tse because testing the interphase region of the fiber/matrix composite would have allowed the skilled artisan to test the bonding (see Tse, Abstract) and measure the specific load changes (see Tse, column 6 lines 6-10).

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary Kate B Baran whose telephone number is (703) 305-4474. The examiner can normally be reached on Monday - Friday from 8:00 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S Hoff can be reached on (703) 308-1677. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

MKB
August 11, 2003

Marc S. Hoff
MARC S. HOFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800